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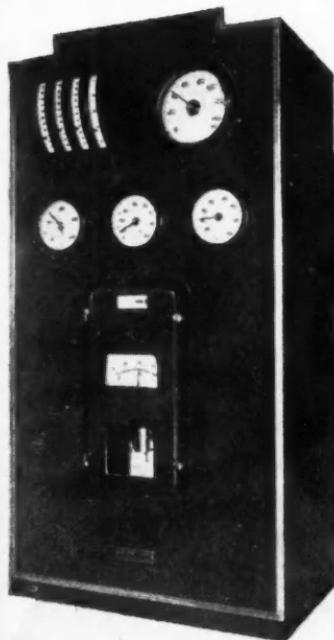
The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. LII
No. 1341

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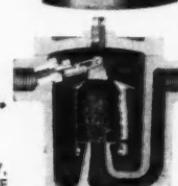
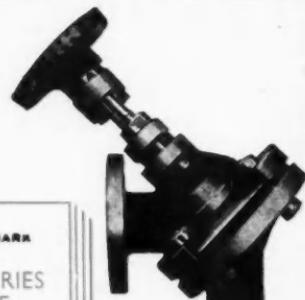
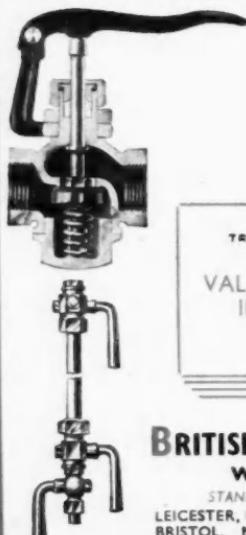
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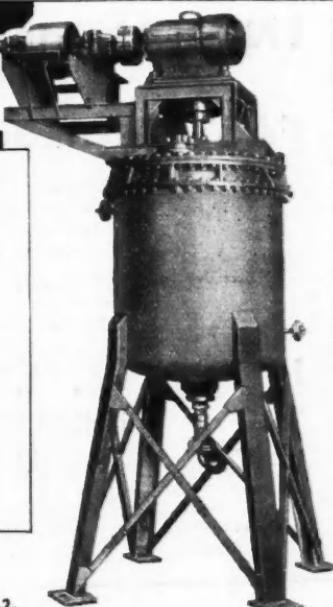
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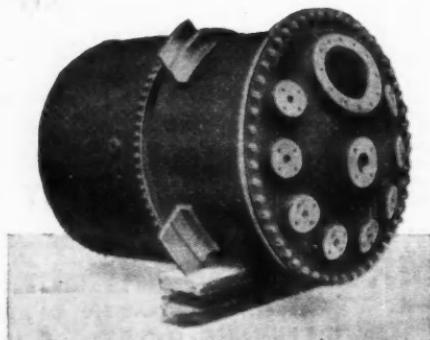
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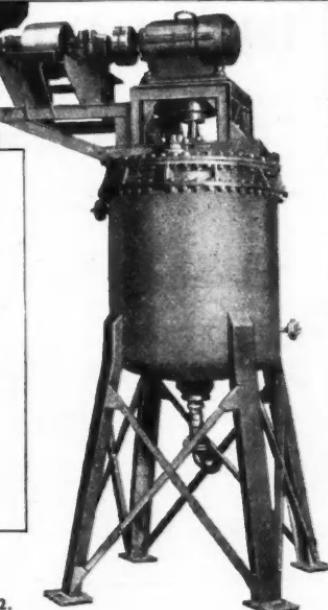
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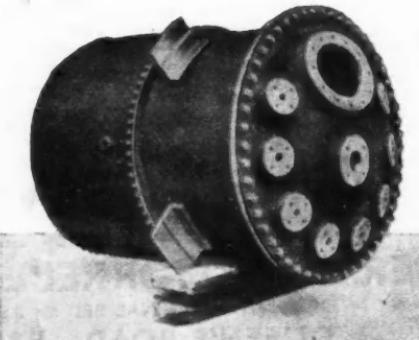
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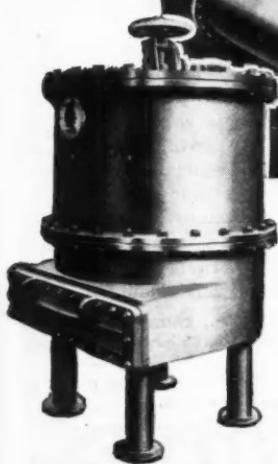
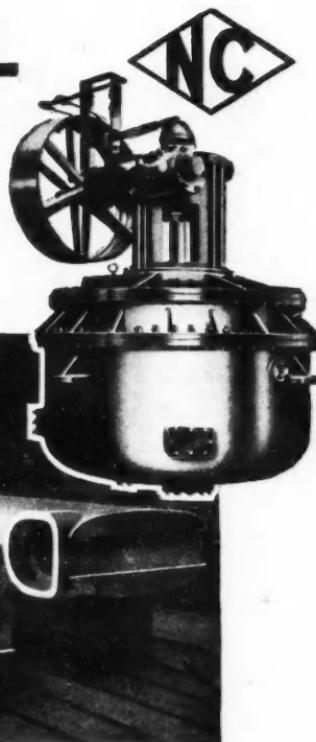
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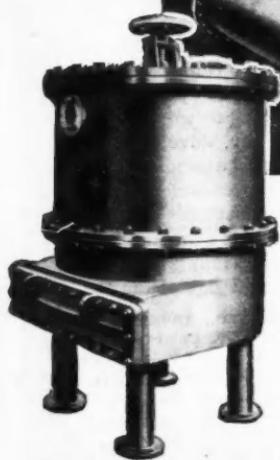
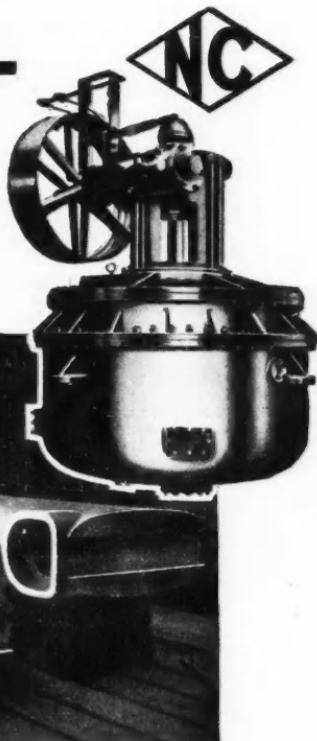


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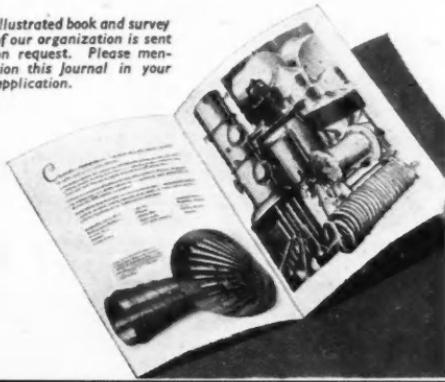
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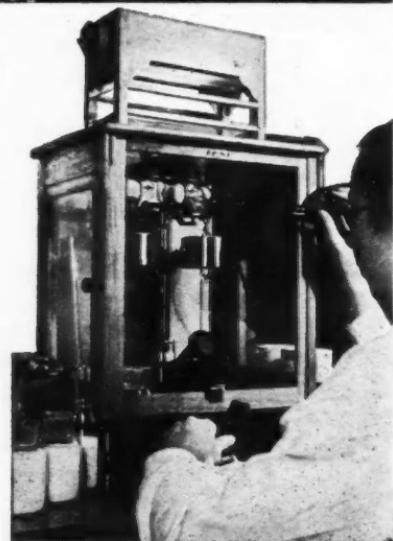
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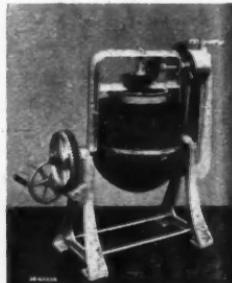


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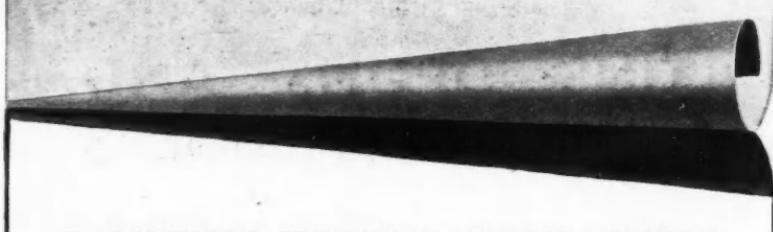
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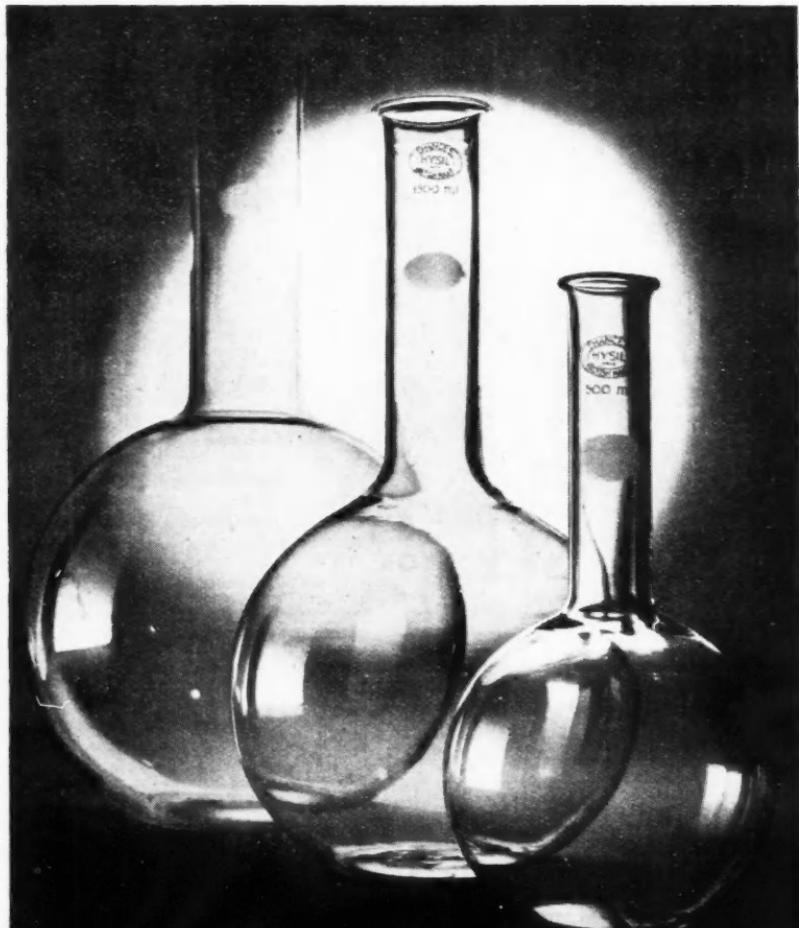
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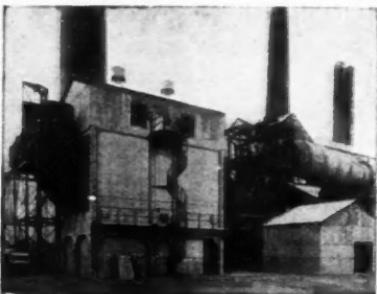
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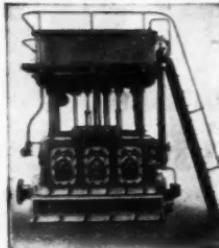
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Education and Industry

INDUSTRY is deeply concerned, and rightly so, about the human raw material that is provided for it. No battle-line is stronger than the individuals manning it; and industry depends for its effectiveness upon the personalities of those who direct it and those who are engaged in it. It is, however, extremely difficult to get any definite statement of the extent and direction to which entrants to industry should be trained. There are also diverse opinions as to the age at which technological training should be given and as to what it should embrace. This divergence of opinion is quite understandable because it reflects the diversity of industry itself. If no more than the major diversities are considered, there are the views of those whose primary function is research, management, production, design, patents, fabrication of plant, maintenance of plant, finance, sales, administration, and accountancy. It is safe to say that few people are equally at home in all these branches of industry and that the characteristics of those who can successfully engage in these diverse branches are as varied as the occupations themselves. Consequently, the

opinions as to training and characteristics are likely to be equally varied. There may be wisdom in the multitude of counsellors. There will certainly be confusion unless this orientation or viewpoint is given full allowance in deciding between conflicting opinions.

This diversity of view was illustrated at the Conference of Industrial Representatives held at Imperial College last December to discuss "Industry and University Education." Those whose primary work lay in works management and production clearly had views different from those who directed research laboratories. Nevertheless, when due allowance is made for the inevitable bias that must arise from personal experience, certain broad principles emerge which we shall endeavour to disentangle

from the mass of accompanying verbiage. These views confirm in general those that have been expressed in leading articles in THE CHEMICAL AGE over the past decade.

The purpose of industry is the production of saleable goods of a quality and at a price that will satisfy the consumer. The discovery of new saleable goods, the reduction of the cost, or the improvement in the quality or useful-

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ness of known goods assist materially in fulfilling the purpose of industry. Many operations are involved in achieving success. Costing and accountancy are fundamental; engineering and efficient plant operation lie at the basis of successful production; research must be prosecuted if stagnation is not to set in; products must be sold and, moreover, sold at a price that will allow a margin for profit and for all the expenses incurred in running a successful business; management must lead industry and co-ordinate the parts. Clearly, there must be a diversity of training to fit individuals for these widely differing tasks. Clearly, also, there must be a selection of individuals to ensure that when trained the individual will not only fit in to the whole orderly plan, but that he will be happy in his place in the team and will do his best work in that place. That requires selection before training has gone too far.

The emphasis placed in universities on research too often leads students to ask for research posts in which they may continue the academic ("fundamental") type of research to which they have been accustomed in the university, irrespective of whether they are fitted for that work as a career or not. Sufficient experience has now been gained by the National Institute of Industrial Psychology for it to be seriously suggested that every boy and girl on attaining the age of 16 should be examined by the methods of psychology before choosing a career. Individuals should have complete freedom of choice, but much disappointment would be avoided by guidance.

The Conference was mainly concerned with technical and scientific training, and from this stage we shall restrict our analysis to that. There will always be in industry room for a few research men who have been trained in chemistry or physics to the highest degree, including the latest developments in the higher levels of pure science; and when an individual shows real ability his training should be conducted to that degree. Intimate acquaintance with these somewhat ethereal regions of scientific theory is not yet of value to industry, however, and the bulk of entrants to industry should not be overburdened with this scientific foliage.

Industry requires four types of brain,

as defined by Dr. Dunsheath: research, design, production, and teaching. No one of these branches should have all the best brains; we want first-class men in every sphere, if only to preserve adequate balance. The view was put forward, also by Dr. Dunsheath, that universities should aim to produce leaders. This raises a very large issue. The public schools have for generations produced leaders of the nation; not all public-school men are fitted to be leaders, but at least it would appear that an educational system can predispose men to leadership. All depends on the individual. The real leader is generally born so, or made so by environment, though he can be improved by training. Whatever be the truth of this, it is certain that since "a knowledge of the facts is the lowest form of education," our educational institutions should study to produce men who can blend with their fellows into a team, men who have the right personal attitude to life, who are able to make allowances for the peculiarities and personal reactions of their fellow men and women—"All is queer save thee and me," said the Quaker, "and thee is a little queer"—who can gain the co-operation of their older colleagues, and who in short can walk tactfully through an imperfect world. Sir Richard Livingstone once remarked: "Education is what remains after we have forgotten all we have learnt." There is clearly a human side to education that should bulk larger in our schools and colleges than the accumulation of facts.

How far should the accumulation of facts be taken in schools and universities? Our view, and it is widely supported by what was said at the Conference, is that factual learning should not be overdone. We believe that the broad outlines of the essential sciences should be taught, but that they should not be overladen by too much intricate detail. The technical man who is likely to be in his right sphere does not cease to learn when he leaves his university, and since he then generally specialises in the particular industry he happens to have entered, he uses only certain branches of science, and rapidly forgets the rest. The education of the technical man continues from his own reading after he has entered industry,

and never stops till he retires—and not always then.

Universities too often seem to act on the belief that anything they fail to teach a man will never be learned. Let them rather recognise that they should turn out men and women who are imbued with the desire to attain knowledge, who know what knowledge is available and roughly where—or at least how—to find it. Dr. Lang recorded that in his work as Appointments Registrar of the Institute of Physics, he found it was the classical physics that employers needed. "What I think these employers want is people who know physics on a broad basis with a sound knowledge of such things as surface tension, temperature measurement, infra-red, thermal conductivity, and the like. They want these men to know also about electronics and the quantum theory, and so on, but they do not want the course made top-heavy by 'modern physics' so much of which is included because it is spectacular." In plain fact, this indicates that a good well-ordered pass degree with plenty of social life at the university is better training for most industrial jobs than an academic honours degree, to attain which the student must become little better than a walking text-book. Schools with their systems of cramming for scholarships are even greater offenders; they start the process at an impressionable age, and ruin many a good brain through overwork in the early teens.

There is the important question as to whether the student at the university or technical college should specialise. On the research side we should agree with Mr. E. R. Davies, who pointed out that "the problems of the research worker always tend to lead him back to problems in pure or applied science which are not peculiar to his industry." The industrial research worker, therefore, should not specialise in a branch of technology until he has fully acquired proficiency in his chosen branch or branches of science. He would apply this, it would seem, also to other workers in industry, for he propounds this very interesting question: "As the technology of an industry progresses from a craft to an applied science is not the demand for technologists likely to decrease and that for trained scientists to

increase?" Our reply would be that the "trained scientists" must still specialise in certain branches of science which are particularly applied to the chosen industry. The technologist in the iron and steel industry, for example, must specialise in metallurgy, in heat transmission, and fuel technology. He requires virtually no knowledge of organic chemistry, or sound, or many other common branches of science.

Finally, there is the question of when a man should be trained for industry. The present system, whereby bright boys are pushed through a scholarship (if possible) or take Higher Certificate at school and then proceed straight to a university to take the highest degree that they can hope to get, leads, in the opinion of many, to the position that all the degree men entering industry wish to become research workers, while 60 per cent. of them refuse to become anything else; whereas industry wants more production men, shift engineers, and so forth. Recent inquiries seem to suggest that in many of our basic industries the most pressing problems are not those of research—though these must not be neglected—but of production.

On the other hand, Professor Bairstow stated that more than 90 per cent. of students at a university are not trained for research, and that less than 10 per cent. attempt one of the higher degrees. That may be true, particularly when it is remembered that "students at a university" includes the Arts people and the teachers for lower-grade schools. It is certainly true that industrialists have claimed that they could not get enough production men from the universities. We should seriously suggest that every boy desirous of entering industry as a career should be made to spend two years in industry between school and university, during which time his prospective employer should give him ample chance of deciding what line he is best fitted for. After that his university course will be very much more effective if he realises while he is learning how valuable that learning will be. We like the idea of one firm which engages young men, and, when it is felt that the youth has shown himself to be sufficiently promising, sends him to the university; this system seems to have worked extremely well.

NOTES AND COMMENTS

The Spread of Science

IF Newton had lived in the present age, the *Principia* would most likely never have been published. Professor Allan Ferguson, in the current number of *Endeavour*, tells the story of how it was only through the tact, enthusiasm, and persuasiveness of Halley that Newton was induced to put forward his scientific theories in connected form. Quite disinterested in his personal fame, the great scientist would certainly today have made the difficulties of paper control an excuse to refrain from publishing, Halley's insistence notwithstanding. Cavendish was even worse; it was purely by accident, as Professor Ferguson points out, that Clerk Maxwell discovered, in some miscellaneous papers, that the shy savant had anticipated Ohm's Law by nearly half a century. Not all men of science, of course, are so reluctant to rush into print; some, indeed, are too eager and publish before putting their theories to the final proof. Their offence is a venial one, however, and they are always subject to correction. The point is that more scientific ideas are required in this world, nowadays especially; and, as we are never tired of affirming, it is in the best interests of humanity that it should be made easy for them to find the means of publication. As it is, official purblindness and red tape create every possible obstacle.

Science and Islam

EVEN in the Muslim world of the Middle Ages, as we learn from the leading article in the same issue of *Endeavour*, scientists—or chemists at any rate—hid their light under a bushel. Geber, the first great chemist in history, is known exclusively by his writings. So scant a record has been preserved of his actual life that the very century in which he lived is uncertain. At all events, from the 9th to the 13th century, Islam led the world in matters of science. For reasons which we are not concerned with here, the cultural level of the Islamic countries declined through the succeeding centuries from the lofty pitch which it had reached in the favouring atmosphere of Baghdad and

Cordoba. The raw material is still there, however, and *Endeavour* is fulfilling a really useful function in calling attention to the fact that only the opportunity needs to be provided, and that, since some 100 millions of His Majesty's subjects are Muslims, it would be most fitting if that opportunity were to be offered by the British Commonwealth to that part of Islam bearing allegiance to the Crown.

Chemical Detection on the Farm

DETECTIVES in fiction, from Sherlock Holmes to Dr. Thorndyke, have often shown a predilection for chemistry. It will be remembered, for example, that Holmes, taking advantage of his presumed death in the Reichenbach falls, put in some useful work in a laboratory at Montpellier on the investigation of coal-tar by-products. In actual fact, the chemist is often called to the aid of the police, and the Home Office, as is well known, has a special department for this purpose, to deal with the popular "unknown tropical poisons" among other things. An article in the January issue of *J. Soc. Chem. Ind.* reveals the forensic chemist helping the cause of justice in a less notorious way, to wit, in distinguishing between the intentional and the accidental firing of hay—often an important point from the point of view of insurance. Messrs. J. B. Firth and R. E. Stuckey, of the Home Office Forensic Science Laboratory at Preston, give the results of their investigation of samples of burnt hay from various causes. A notable discovery is the way in which (in spontaneous stack fires) the total acidity, calculated as the percentage of lactic acid on dry material, increases to a maximum as the seat of the fire is approached, decreasing, of course, when actual charring begins. No such phenomenon appears with directly-fired hay, and an experienced examiner, they say, can recognise also the peculiar odour of self-burnt hay. Apart, however, from the theory that a chemical reaction occurs which needs heat insulation and absence of air, no absolutely definite cause is assigned to spontaneous stack fires.

Films and Chemistry*

Some Applications of the Cinematograph

by R. J. RATHBONE, Ph.D., B.Sc., A.R.I.C., A.R.P.S.

TO-DAY it is generally acknowledged that the cinema can have an important cultural influence on the life of the community. Suffice to say that we have now come to appreciate the tremendous power of the film as a means of instruction and a weapon of propaganda. The Services use films very extensively to train personnel, and the Ministry of Information relies to a very great extent on films to educate and mould public opinion. In recent years the use of the film has been extended to the field of science.¹ In medicine, films of surgical operations and techniques form an essential part in the training of the student. In biology, there exist several hundreds of excellent films, many of which have been very widely seen. After the war, when many of the now secret Services' training films are made available, there will be a good supply of films on physics and engineering.

However, relatively few good films on chemistry are available, which is surely a matter for regret. There are several possible reasons for this dearth. The basic concepts of chemistry, atoms, molecules, valency bonds, etc., cannot be photographed, at least not directly. But the modern technique of moving diagrams completely overcomes this difficulty; indeed, almost anything can be illustrated on the screen. Another difficulty has been that in the study of chemical reactions colour changes play an important part. The colour film has an important contribution to make towards the solution of this problem. Furthermore, there are few good films on chemistry, because no one has thought it worth their while to make any.

The Educational Aspect

The first and most obvious application is to the teaching of chemistry, and here several aspects may be considered. Complicated or elaborate experiments, which time or equipment do not permit the student to carry out himself, may often be demonstrated by a film. If the film is well made, all the students will at once see the experiment from the best viewpoint, with the important points seen in close up and repeated if necessary, and there is, of course, no danger of the demonstration going wrong or "not working." A film made recently by the Royal Technical College, Glasgow, on Brownian Movement,² serves as a good

example of this type of film. It illustrates an important phenomenon, about which every science student is told, and is expected to know, but very often he never sees it for himself. It is not suggested, of course, that the teaching film can ever replace practical work and "live" demonstrations, but it can well supplement these.

Films can also help in teaching chemical theory. Most science masters will agree that, at present, there are no true curriculum films. All that exist are background films—shown to pupils as a special treat at the end of term. It should be obvious, however, that good diagrammatic films could be of great value in illustrating such points as phase rule, atomic structure, and, particularly in organic chemistry, the mechanism of reactions. The possibilities of the stereoscopic film open up the whole field of structural chemistry to illustration on the screen.

The history of chemistry is very rightly an important item in teaching, and here again the film could portray the step by step growth of knowledge in a vivid and memorable way. More films are wanted on the lives of famous scientists and their work. There have already been films on the lives of Pasteur, Ehrlich, Madame Curie, and one produced by the British Council on the life of Michael Faraday. Some of these were most commendable, others were not so good.

Films in Industry and Research

Industrial applications of chemistry are particularly suited to exposition by film treatment. The interrelation of laboratory and chemical works can be shown clearly and dramatically. A camera shot of dye being formed in a test tube can be followed by a shot of a 1000-gallon vat in a dye works, or a shot of a few crystals on a charcoal block followed by work at a blast furnace. Applications, which would take pages of writing, can be described in a few seconds by such methods.

There is another type of film which the chemist must take note of, namely, the research film. The use of the cine film as a scientific tool can record and demonstrate new relationships which could not have been detected by other means. It is impossible to say what films can or should be made, but if chemists become "film conscious" they will doubtless find applications waiting in their own special field.

Another, and possibly the most important, contribution of films to chemistry is in the field of "social relations." One of the aims of organisations like the British Association of Chemists is to improve the status

* Lecture delivered at a joint meeting of the London Section of the British Association of Chemists and the Scientific Film Association, on December 13, 1944, at the Royal Institution.

of the profession, and one way of raising the prestige of the chemist is to create a better understanding and appreciation of chemistry among the general public and to make known to all the great part chemistry plays in the modern world. People use the word plastics frequently, but do they know what work goes into their manufacture? Everyone has heard of sulphanilamide, but do they know of the part chemists have taken in its development? Beautiful dyes for textiles are taken for granted, but is the research work which goes into the development of a new colour appreciated? The film can do much to remedy this state of affairs. There is little doubt that the public will see a film and absorb its message, whereas books on the same issue may never get beyond the bookstall.

Scientific Film Society's Growth

It is necessary to consider the potential audience for this last type of film. The numbers of such films shown now in the public cinemas are very small. There is, however, a section of the public eager to see such films—this is exemplified by the Scientific Film Society. These societies, which are springing up in all parts of the country, are composed partly of scientists, but very largely of members of the lay public, interested to see scientific documentary films. In 1940, there were only three of these societies in this country, one in England and two in Scotland. To-day their number is nearly 50, with a total membership of about 10,000. This amazing wartime growth is surely a measure of the interest displayed in the subject, and augurs well for the future.

There is one final point to consider. Who is to make these films of the types mentioned above? Film production is a relatively costly business, although it should be remembered that a very great deal can be achieved on the less costly sub-standard film and equipment. Most of the groups and societies giving documentary and scientific film shows use 16 mm. equipment. Nearly all the scientific and technical films in this country are in most cases available only on 16 mm. film. Yet in spite of the importance of this kind of film few producers have considered chemistry films as a commercial proposition and for this reason it seems that production will have to be sponsored more actively. Large industrial organisations have already taken steps in this direction, and will probably continue to do so. It seems desirable that the Ministry of Education should give support, and also that learned societies and professional bodies should become more aware of the possibilities of scientific films.

REFERENCES

- ¹ *Nature*, 152, 623; 153, 784.
- ² *Nature*, 154, 155. G. Bell: *The Scientific Outlook and its Presentation of Films*.

Egypt's Chemical Industry

Recent Growth of Manufactures

UNTIL 1937, Egypt relied almost entirely, from the industrial point of view, on one crop, viz.: cotton; but the war has brought about a considerable expansion in the industrialisation of the country, in which the chemical industry plays an important part. For example, cellulose paint solvents, xylol, benzol, etc., are produced by Labib Nissim's Pigment Paint Factory, Shmeidler's Chemical Works, and the Egyptian Chemical and Drug Industries, Ltd. Utilisation of by-products of the gas industry has also started, and an iron and steel smelting concern began production in 1942, while Sayed Yassine Bey's glassworks have conducted successful experiments in the production of coloured glass. The Société Misr pour l'Industrie Pharmaceutique, with a capital of £E30,000, now employs over 200 workers and has taken up the production of a number of pharmaceutical products formerly imported from abroad.

Mineral Developments

Ilmenite, garnet, magnetite, zircon, and monazite are obtained in Egypt from black sand brought down to the mouths of the Nile, near Rosetta and Damietta, from the hills of Ethiopia. The minerals are extracted by plants at Rosetta and at Alexandria, and small-scale operations involve the use of three magnetic separators and three small wet concentrating tables.

Prospecting in non-ferrous minerals is proceeding in the desert ranges bordering the Red Sea. In the neighbourhood of the Red Sea port of Kosseir extensive deposits of lead and zinc have been reported at Umm Gheig, about 30 miles south, while a copper deposit is being explored about 100 miles further south. Molybdenite is being prospected in the mountains west of the oil wells at Hurghada, near the mouth of the Gulf of Suez.

On the Nile above Luxor extensive alluvial deposits of tin in the Edfu district have been prospected by the Department of Mines and Quarries, and licences have been issued to undertake exploration for chromite in the desert some 60 miles east of Edfu.

The Swedish Parliament has voted in favour of an expansion of the Norbottens A/B, the State-owned iron works near Lulea. A new electrically-heated furnace with an annual pig-iron capacity of about 30,000 tons, raising total capacity to about 90,000 tons, is to be erected at a cost of 3,500,000 crowns. A new Thomas steel plant is also to be constructed at a cost of 4,500,000 crowns, yielding as a by-product about 18,000 tons of phosphate fertiliser.

Production of Perchlorates

Continuous Electrolytic Process

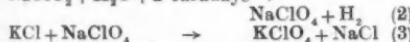
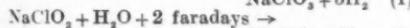
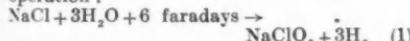
PRODUCTION of chlorate and perchlorate chemicals in the United States has risen sharply since 1940 as a result of the establishment of new plants throughout the country. By 1941 domestic production became a matter of necessity, and owing to mounting military and civilian demands, potassium perchlorate was placed on the list of strategic chemicals, and all chlorate and perchlorate chemicals were put under allocation. Further impetus was furnished by the investigations of electrolytic sodium chlorate by P. H. Groggins and his Department of Agriculture associates.

These were the circumstances surrounding the formation of the Western Electro-Chemical Co., Los Angeles, in 1941, as described by J. C. Schumacher, technical director of the company in *Chem. Met. Eng.* (1944, 51, 12, 108). The primary objective from the outset was the evolution of a continuous process, with increased efficiency of operation.

A survey of previous processes revealed that numerous hazards are involved in the commercial production of chlorates and perchlorates, e.g., the evolution of explosive mixtures of gases from the electrolytic cells, formation of explosive combinations by contamination of pump and bearing lubricants, and the soiling of workers' clothing with chlorate and perchlorate solutions. Successful commercial operation for almost a year speaks well for the plant design which was developed to meet such hazards.

Three Essential Steps

Chemistry of the process may be epitomised in the following three reactions representing the three essential steps in the operation:



Production of sodium chlorate is accomplished by continuously feeding a solution high in chloride and low in chlorate into the electrolytic system while an equal portion of the system liquor high in chlorate and low in chloride is simultaneously pumped out. In actual practice a saturated solution of sodium chloride is adjusted to desired conditions in a dissolver by the addition of hydrochloric acid and sodium bichromate, while the circulating mother liquor from the sodium chlorate centrifuge is pumped to the same dissolver. After sufficient agitation this feed liquor is allowed to flow by gravity through a regulating valve into the sump tank of the chlorate electrolytic system, the

volume of which is kept at a constant level by the regulating valve. From here the liquor is pumped to constant level feed tanks and from there to the cells. Electrolysis is carried on continuously in the cell compartments with the conversion of sodium chloride to sodium chlorate. During electrolysis the entire cell system is cooled by a circulating medium and pH is maintained by the addition of dilute hydrochloric acid. Liquor from the cells is conducted back to the sump tank for subsequent recirculation.

The same centrifugal pump which moves the electrolyte through the cell system is also equipped with a constant measuring device which allows a portion of the liquor, equal to the volume being added, to be withdrawn from the system into a surge tank. Here the liquor stands for a time so that graphite, which has separated from the anodes as the natural result of electrolysis, has a chance to settle to the bottom of the tank and be drawn off from time to time. The supernatant chlorate liquor is filtered and retained in a storage tank until it is pumped to a crystalliser of special design, where by temperature reduction the sodium chlorate crystals are precipitated and withdrawn from the bottom. The crystal-and-liquor mass is run through a centrifugal extractor where the mother liquor is removed and sent back to the head of the process. Sodium chlorate crystals (99.5 per cent. pure on a dry basis) are washed to remove occluded mother liquor, dried centrifugally, and stored for use in the perchlorate-forming electrolysis which follows.

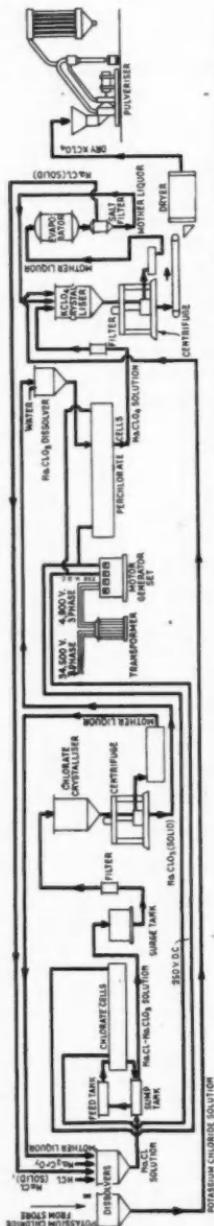
Sodium Perchlorate

Production of sodium perchlorate is begun by dissolving sodium chlorate in water and allowing it to flow by gravity through a regulating valve to the perchlorate electrolytic system. The pumping, cooling, and pump-out designs of this are identical with those of the chlorate system, except that a smaller volume of liquor is handled and the cell characteristics are different, as shown in

OPERATING CHARACTERISTICS OF CELLS

		Chlorate Cells	Perchlorate Cells
Anode material		Graphite	Platinum
Anode current density, amp. per sq. ft.	... ...	30	250
Cathode material	... ...	Steel	Steel
Cathode current density, amp. per sq. ft.	... ...	50	140
Volts per cell	... ...	3.0-3.5	5.5-6.0
Amp. per cell	... ...	2,500	2,500
Avg. current efficiency, %	... 75	90-92	90-92
Temperature, deg. C.	... 45	65	NaClO
Electrolyte	... NaCl		

the accompanying table. Concentrated sodium perchlorate from the cells must first



Flow-sheet of the Western Electro-Chemical Co.'s process for producing sodium and potassium perchlorates (adapted from *Chem. Met. Eng.*)

be treated in a tank for removal of reagents used in processing. It is then ready for the third, and final, stage.

Potassium Perchlorate

Production of potassium perchlorate is performed in a crystallising tank. Filtered potassium chloride solution is added to the sodium perchlorate liquor, and potassium perchlorate crystals are precipitated from solution. These are removed from the crystalliser, centrifuged, and washed. The mother liquor contains sodium chloride as a result of the metathetical reaction which produced potassium perchlorate. Concentration of the liquor in an evaporator causes the sodium chloride to settle out and permits it to be separated from the salt liquor slurry by a filtration. This solid NaCl is returned to the dissolver at the beginning of the process. The washed potassium perchlorate is conveyed to a steam-heated continuous-conveyor drier which produces a white granular product containing approximately 0.03 per cent. moisture. The dried product is ground in a hammer-mill with a cyclone attachment for the collection of fines. The product is packed for shipment in 100-lb. bags or steel drums.

EXPORTS IN 1944

Since exports were discussed in a general way in THE CHEMICAL AGE of February 24, the Board of Trade has issued further statistics regarding the chief classes of commodities exported. Among chemicals and allied products, the only remarkable increase occurred in exports of ammonium sulphate which rose from 6000 tons in 1943 to 133,000 tons last year, a quantity equal to about two-fifths of the 1938 figure of 313,000 tons. This increase was due, in the main, to larger supplies to Empire countries. However, exports of other principal classes of chemicals show a decline as compared with the previous year's level; sodium compounds aggregate 345,000 tons, a decline by 69,000 tons, disinfectants fell from 432,000 ewt. to 309,000 ewt., while exports of finished dyestuffs amounted to 93,000 ewt., compared with 137,000 ewt. in 1943, and 80,000 ewt. in 1938. Larger exports to India accounted for the relatively favourable development in the case of dyestuffs, while, on the other hand, a reduction in orders received from Latin America was the reason for the declines in the other principal groups. Exports of cement, although still far below the pre-war level, increased from 164,000 tons to 321,000 tons, while declines were registered in both plate and sheet glass (from 836,000 ewt. to 762,000 ewt.), as well as in asbestos manufactures (from 538,000 ewt. to 472,000 ewt.). Exports of pottery were maintained at 80,000 tons.

Chemical Education

Findings of the Joint Conference

AT a joint meeting of the London sections of the Royal Institute of Chemistry, the British Association of Chemists, and the Association of Scientific Workers, held in the Pharmaceutical Society's rooms on February 21, a spirited discussion on Chemical Education took place, with Dr. G. L. Riddell in the chair.

The knowledge and skill expected from an analytical chemist were discussed by Dr. J. R. Nicholls. He stressed the need for training in fundamental chemistry and suggested that chemical education should include some account of the factors which determine whether a particular chemical reaction is suitable for use on a large scale, and concluded by regretting that there are no chairs of Analytical Chemistry at the universities and no academic schools of research in analysis.

Dr. F. W. Stoyle considered that for a works chemist too high a degree of specialisation in the degree course should be discouraged. After employment, the graduate should supplement the academic training by courses in technology and ancillary subjects such as costing, factory legislation, etc.

Mr. F. A. Robinson, who spoke on "What is expected of the Research Chemist?", contended that the primary requirement was a sound grasp of the principles of scientific research and an ability to apply these to whatever problems are encountered. Healthy scepticism, inventiveness, patience, the ability to read intelligently and an interest in the utilitarian aspect of his work were also essential. The last quality was the most neglected in university training and might be fostered by informing the student of technological as well as academic discoveries.

University Training

Speaking on university training, Dr. J. Kenyon pointed out that chemistry is a wonderful blend of craft and science and that the training of the chemist is, therefore, twofold in character. In the laboratory the aim is to acquire manipulative skill and develop powers of observation and deduction, while in the lecture-room the fundamental principles of the science are acquired. He stressed the importance of the latter and did not conceive it to be the function of university training to produce youthful specialists ready to fulfil the specific requirements of any particular industry. Rather is it to supply young men and women capable of applying the results of their training—a skilled hand, an observing eye, a well-stored mind, a critical judgment, and a logical intellect—to meet the varied demands of the chemical industry.

Tribute to the sterling qualities of the part-time graduate was paid by Dr. E. A. Rudge. Against the advantages he showed in training and experience were serious disadvantages of narrowness in outlook since he lacked the experience of academic life. This could be overcome by wider provision for part-time day classes which should be integrated into the academic course.

Valuable Suggestions

A number of contributors to the discussion considered that during university chemical courses a certain amount of technological training and some knowledge of standard forms of plant should be given, so that graduates should not be completely at a loss on entering industry. This training would be helped by interchange between industrial chemists and university teachers, by works visits and vacation employment in industry. Training in the use of literature was also considered desirable. Students should be given some idea of the conditions, requirements, and possibilities in industry to order that they might select, to some extent, the type of work for which they were fitted. More attention should be paid to inculcating the scientific outlook quite early in ordinary school training. Part-time evening study, while valuable, was considered too strenuous, and more day training and State bursaries for full-time study were considered desirable. There should also be courses for the training of laboratory assistants and stewards, and there was need for refresher courses in a variety of subjects.

The Towers Sliding Weight Balance, which has been produced to meet the demand for a laboratory bench scale that does not require small weights and, though sensitive to 1/10th gm., is of robust construction, is described in a leaflet just issued by J. W. TOWERS & CO., LTD., Widnes. The balance is fitted with two scales and the appropriate rider weights. One scale reads 0-10 gm. in 1/10th gm., and the other scale 0-200 gm. in 10 gm.; weights are therefore unnecessary when weighing up to 210 gm.

Special attention has been given to the adjustment and clamping of the heavier rider weight on the scale. A spring catch obviates the loss of oscillation, and consequent reduced sensitivity, inherent with a swinging weight. The pans on the standard design are of polished stainless steel 7 in. in diameter and slightly concave. Flat 6-in. porcelain pans can be supplied without extra charge. This size will accommodate bottles up to a 90-oz. winchester.

India's Scientific Prospects

Sir S. S. Bhatnagar's Address

SIR SHANTI S. BHATNAGAR, in the presidential address delivered in his absence at the Indian Science Congress held early in January at Nagpur, made a "powerful plea for the development of India's hydro-electric power resources and of the by-product industries of coal distillation, the petroleum industry, and the textile, sugar, jute, metallurgical and chemical industries, which would give the country a different complexion altogether and make possible a co-ordinated programme of development in all directions. "I am convinced," he stated, "that science in India has no future unless its agriculture and its industries are fully developed: more food and more health are dependent on these factors." The present absence of a national Government is no excuse for India's men and women not to devise means of bettering the lot of their fellows. Sir Shanti was not convinced that the rich and the wise in the land had done all they could for their country's agricultural and industrial development.

Those who knew India intimately, he continued, were fully aware of the fact that attention to agriculture alone cannot solve the problem of her poverty. Biology must be helped by physics, chemistry, and engineering, and India cannot be healthy unless a good proportion of her population is devoted to pursuits other than agricultural. On a value basis, about 88 per cent. of the world's agricultural produce is at present used as food, 8 per cent. as textiles, and only 4 per cent. as industrial raw materials. The last two together form roughly one-third of the raw materials of industry. Agriculture must supply more of these materials, but they cannot profitably be used unless the factory becomes an adjunct of the farm. Industry in the United States is moving towards that goal, and India may well learn a lesson there.

Results Achieved

Earlier in his speech, Sir Shanti, having paid tribute to the memory of the late Sir P. C. Ray, stated that Professor A. V. Hill's visit to India was perhaps the most outstanding event in the country's scientific life in recent years. Some of his recommendations had already borne fruit, such as the creation of a Department of Planning under Sir Ardesir Dalal, a past-president of the Indian Science Congress, while others, it was hoped, would also be accepted by the Government of India.

In this country, he said, he and his colleagues were given the most cordial welcome and had learned something of the vast strides made during the war. "It is a

tragedy," Sir Shanti observes, "that a ruthless war and almost universal bloodshed should be necessary for this new awakening, for it should have been obvious without it that science can play and must play an essential part for human advancement." He also revealed that Lord McGowan had assured him that I.C.I.'s eighty scholarships at British universities would be open to Indian students and that he also had promised to consider the question of endowing research fellowship in Indian universities.

Sir Shanti concluded by saying that he dreamt of the Tennessee Valley, but not without hope, for what had happened to the Tennessee might well happen to any river of India, if the Government and the people just gave science a chance.

FRACTIONATION OF BINARY MIXTURES

At a meeting of the North-Western branch of the Institution of Chemical Engineers on February 17 at the College of Technology, Manchester, Dr. J. Anderson Storror, M.Sc.Tech., presented a paper on "The Fractionation of Binary Mixtures in a Wetted-Wall Column." The unit process of fractionation in a wetted-wall column, he pointed out, was regarded as a diffusional one. Differential measurements of temperature were made on the middle section of a column 1 in. in diameter and 55 in. long under total reflux. A constant rate of vapour feed to the column was obtained from a small, packed column which was fed with vapour distilled from a liquid mixture in an electrically-heated kettle. The condensation temperature of the vapour was taken as a measure of its composition.

An attempt was made to fit the results to Gilliland's equation in which the quotient of the diameter of the column and the effective thickness of the vapour film at the interface is regarded as a function of the Reynolds number of the vapour feed and of the Schmidt number for the vapour film. The differential results obtained from ethanol-water, methanol-water, and acetone-water mixtures respectively could only very inaccurately be fitted to Gilliland's equation which had been used for overall conditions in another diffusional process. Dr. Storror was of the opinion that all the variables in the three systems had not been used in the theoretical approach to the problem, and that the resistance of the liquid film to the diffusion of the vapour had an influence on the process.

British Standards Institution

Luncheon for the President

AT the Savoy Hotel, London, W.C.2, on March 8, the British Standards Institution gave a luncheon to members and their friends with the object of enabling the president, Lord Woolton, to make the acquaintance of members of the Institution. An attendance of some 300 included many well-known personalities in the chemical and engineering industries.

Origin of the B.S.I.

Sir John Greenly, chairman of Babcock & Wilcox, Ltd., proposed the toast of the Institution, coupled with the name of the president. He referred to the historic part that the Institution had played in the progressive industrial life of the country, dating its basic origin back to the mid-1890's when a letter to *The Times*, from a Mr. Skelton, a prominent London member of the iron and steel trade, called attention to the excessive number of different iron and steel components and remarked that there was "too much individualism in this country in quarters where it is not *economically* advantageous." Sir John traced the rise of the Institution from those small stirrings, but pointed out that standardisation did not imply arbitrary control; it must rest on general consent. To-day, for example, designers and ultimate consumers were together represented on 570 committees and nearly 1000 sub-committees of the Institution. He reminded his hearers that standards must not be uneconomic; articles prepared in accordance with British Standard Specifications must not be uncompetitive in world markets. The term "British Standard," he maintained, should have a definite meaning, and serve in the way of a hallmark of quality. He concluded with a warm tribute to the president, whose health was drunk with acclamation.

Lord Woolton's Speech

Lord Woolton, responding, recalled the days when—torn from the comfortable and profitable ways of commerce—he was required to clothe the British Army between May and September, 1939—an impossible task without standardisation of quality and design. Referring to the universally high reputation of the Spitfire, he asked whether British industry was in fact so inefficient as some critics, "unbiased by experience," had so insistently made out. He thought that the public should be made to understand the advantage of asking for "British Standard" goods, as representing the best value obtainable and abolishing the old legal caution: *caveat emptor*. He appealed to industry to maintain a high standard in the sellers' market which would obtain after the war. Standards, he said, would enable

post-war factory capacity to be used to the full and economically, just as the war emergency standards had worked during hostilities. They were just the opposite of individualism run riot. He promised to do his best to persuade his colleagues in the Government to get the term "British Standard" to have a real and definite meaning, not to be desecrated by inferior production.

In conclusion, Sir Percy Ashley, vice-president, paid a tribute to Lord Woolton personally. He asked those assembled to allow him to convey a message of sympathy and encouragement to their chairman, Sir William Larke, who had been prevented by illness from attending the luncheon.

A New Insecticide

Triumph of British Research

IN the Hurter Memorial Lecture, delivered on March 8 before the Liverpool section of the Society of Chemical Industry by Dr. Roland Slade, M.C., details were given of a potent new insecticide developed by I.C.I. in their Widnes laboratories during the past five or six years, with a view to finding a substitute for the comparatively rare and costly derris, and one which could be easily synthesised.

Such a substance was discovered in the shape of benzene hexachloride (1,2,3,4,5,6 hexachlorocyclohexane), known briefly as "666" from its formula C₆H₆Cl₆. Further investigation early in 1943 showed that, of the isomers of 666, the γ -isomer (m.p. 108°–111°C.) was more toxic to weevils than any substances which I.C.I. had ever tested. The α - and β -isomers were "relatively inactive, the β -isomer being practically non-toxic. The insecticidal action of 666 was proved to be due almost entirely to the presence of the γ -isomer, which the lecturer named "Gammexane." This is present in the crude material to the extent of 10-12 per cent.

As the information contained in the lecture has come to hand only as we are going to press, a more detailed account will be reserved for our next issue. But when it is realised that DDT appears to have only one-fifth the power of gammexane, it is evident that an insecticidal material of outstanding qualities has been discovered, and one that is all-British in development.

In the Moscow basin coal mines have not only been restored but they are now twice as productive as in 1940. The Kuznetsk basin has also increased its output over 1943 to the extent of over 2,000,000 tons. In the Tula region, the Skuratov coal seams are being vigorously exploited, and at least four new mechanised pits have been lately started up with a capacity of 4000 tons daily.

Parliamentary Topics

British Scientific Publicity

IN the House of Commons last week, Mr. Salt asked the Lord President of the Council whose responsibility it was to ensure that at the earliest possible opportunity, the maximum publicity was given to British scientific achievements connected with the war.

Mr. Attlee replied that individual departments were responsible for publicity in their own fields, and their arrangements were supervised by the Scientific Advisory Committee of the War Cabinet. On the committee's recommendation, an archivist had been appointed to co-ordinate the preparation of the necessary records prior to publication at the earliest time.

Mechanisation of Coal Mines

Mr. James Griffiths asked the Minister of Fuel and Power at how many mines U.S.A. machinery had been introduced and operated; and what the result had been.

The Minister of Fuel and Power: At the present time there are 31 projects, at 27 collieries, operating American or American-type machinery. The results show an output of 4.07 tons per man-shift (to the loading point), as compared with 2.51 tons per man-shift obtained by normal methods.

Scientific Advisers Abroad

Colonel Lyons asked the Secretary of State for Foreign Affairs whether he would consider the advisability of adding a trained scientist to the staff of commercial councilors in selected embassies overseas.

Mr. George Hall: My right hon. Friend is prepared to consider the attachment to His Majesty's Missions of specially qualified scientific and technical advisers when this appears to be in the national interest. In many cases, however, it may prove that the most satisfactory means of attaining our objective is by direct contact between individual scientists, groups of scientists, or business men.

Aluminium Production Cost

Asked by Mr. Douglas what had been the average cost per ton of aluminium produced in this country during each of the last four years, Sir Stafford Cripps refused to reveal the information required. He added that he could not do so because the cost was so closely related to the price paid under Government contract.

Oil Pipelines

Major Lloyd George informed Mr. Woods that it was the intention of the Government to retain ownership of oil pipelines as long as they were required to meet emergency conditions. Their future use and ownership cannot be determined at present.

Irish Mineral Resources

Extended Subsidy Proposed

BEFORE the second reading, in the Dail, of the Irish Minerals Company Bill, which has for its subject the amalgamation of the State-financed enterprises of the Slieveardagh Coalfield Company, and the Minerals Exploration and Development Company, Mr. Lemass, the Minister for Industry and Commerce, made a survey of the efforts already made, and to be made, to exploit Irish mineral resources. The Minerals Explorations & Development Co., he pointed out, examines mineral deposits other than coal which would not normally attract private enterprise. It had been primarily engaged in the production of phosphate rock in Clare and pyrites at Avoca.

Thirty-two thousand tons of phosphate rock have been supplied to fertiliser manufacturers, and deliveries continue at the rate of 1300 tons monthly; but the quarries are now nearing exhaustion and extensive new prospecting is on foot. In the meantime, reserves of rock suitable for mining are being blocked out to enable the present output to be maintained for the coming year. Post-war production of Clare phosphate rock is problematical in view of high production costs and because of the uncertainty as to total reserves. It would, however, be possible after the war to equip the mines with labour-saving devices.

Conditions at Avoca

Avoca ore, said Mr. Lemass, is complex, containing iron pyrites, copper, lead, and zinc. Under existing conditions only the rock with the highest sulphur content was picked out by a laborious and costly process. The selling price, judged by pre-war standards, was high, but still well below that of imported pyrites. To help the company to sell at a rate permitting the sale of the resulting superphosphates at a price within the reach of farmers, a subsidy was paid on sale of Avoca pyrites. This, however, was only a fraction of the subsidy covering the very much higher cost of shipping imported pyrites. Mr. Lemass has been advised that the working of the Avoca mines by the flotation process would "have an expectation of commercial success." Examination of the Glendalough area reveals the possibility that similar exploitation here could be successful, but considerable exploratory work would be needed.

The Minister gave a list of areas in Wicklow, Tipperary, Waterford, Cork, and Monaghan, where arrangements have been made for detailed examination by technical and financial experts. To secure the capital to enable the Minerals Company to carry out its full programme, the limit of advances (at present fixed at £50,000) would have to be extended to £400,000.

Personal Notes

MR. W. H. HIGGINBOTHAM succeeds the late MR. C. K. EVERITT as chairman of Edgar Allen & Co., Ltd., Sheffield.

DR. H. E. ANNETT has been appointed chairman of the New Zealand section of the Royal Institute of Chemistry, in succession to Mr. Philip White.

MR. A. T. ULLMAN, chief chemist at the Newcastle (N.S.W.) Steel Works of the Broken Hill Proprietary Co., Ltd., Australia, for 22 years, has resigned after 30 years' service with the company.

MR. RALPH CRELDEN, managing director of the Widnes Foundry and Engineering Co., Ltd., has been elected chairman of the executive council of the Widnes Chamber of Commerce. In the previous week he was elected president of the Manchester and District Ironfoundry Employers' Association.

DR. RONALD E. LANE, who has been appointed Professor of Industrial Health at the University of Manchester, came to that city in 1927 to work with the Chloride Electrical Storage Company, chiefly on lead poisoning. He is an hon. consulting physician to the Ministry of Supply and has been a lecturer in factory hygiene in the University of Manchester since 1938. The chair of industrial health, the first of its kind in Great Britain, has been instituted through a grant by the Trustees of the Nuffield Foundation. Both teaching and research, the latter to concentrate on health in local industries, are among the principal aims of the new department.

Obituary

The death is reported of MR. JAMES R. ROBERTSON, until recently mining manager of Scottish Oils, Ltd., West Calder. He was fatally injured in a motor car accident near Darlington.

MR. ROBERT FRANKLIN CARR, B.Sc., chairman of the Dearborn Chemical Company, Chicago, and of the Dearborn Chemical Co., Ltd., Toronto, died in Chicago on January 22. He was also a director of the General Aniline & Film Corporation.

SIR DUNCAN WILSON, C.V.O., C.B.E., who died suddenly on March 1 at Sevenoaks, Kent, aged 69, was Chief Inspector of Factories in 1932-40 (having served as factory inspector since 1904 and as deputy-chief since 1930), and secretary to the Industrial Health Research Board in 1918-30. A native of Sheffield, he graduated at Oxford with first-class honours in natural science. He received his knighthood in 1938.

DR. MAX W. CZEKES, who died in Oxford on February 21, aged 72, was a well-known chemist and pharmacist of Vienna, where he worked for many years as managing director of the Chemosan A.G., which he founded and kept up to date in collaboration with the German chemical industry. He left Austria in 1938 under Nazi oppression, and the Chemosan works in Klosterneuburg near Vienna were taken over by the Oesterreichische Heilmittelstelle (Austrian Pharmacological Institute). His name will also always remain connected with the development of the Austrian Red Cross, of which he was a leading spirit.

New Control Orders

Rubber Control

THE Minister of Supply has made the Control of Rubber (No. 24) Order, 1945 (S. R. & O. 1945, No. 194), which came into force on March 1. It revokes and consolidates the provisions regulating acquisition, disposal and consumption of natural and synthetic rubber, latex, gutta percha and balata, previously spread over Orders 1, 10, 13 and 15. The principal amendments are as follows: (a) Prices of liquid latex are no longer statutorily controlled; and the definition now excludes "compounded or processed latex"; (b) trimmings, strippings and dust of rubber, etc., are decontrolled; (c) thiokol is omitted from the definition of "synthetic rubber"; (d) the Orders Nos. 4, 7, 17 and 19, which regulated production of rubber and footwear and rubber hose, are revoked.

The following revised liquid latex prices for sales from Rubber Control stocks, are effective as from March 1 (prices per gallon).

Natural Rubber Latex: at concentrations of less than 45 per cent, 8s.; at concentrations of 45 per cent. and upwards imported before December 31, 1942, 11s. 6d.; at concentrations of 45 per cent. and upwards imported after December 31, 1942, 13s. 6d.

Synthetic Rubber Latex: GR-S Types 1 and 2 (at concentrations of approx. 26.5 per cent.), 7s. 8d.; GR-S Type 3 (at concentrations of approx. 38 per cent.), 10s.; Neoprene Type 571 (at concentrations of approx. 50 per cent.), 16s.

Road-Tar and Pitch Prices

The Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), which came into force on March 5, increases the price of road tar specified in the Seventh Schedule to the Coal Tar Products Prices Order, 1943, by 4d. per gallon. The Minister of Fuel has also approved an increase in the maximum basic price of pitch from 50s. to 60s. per ton f.o.r. at producers' works. This price is established by arrangement with the producers and no Order is therefore needed

General News

The Industrial Health Research Board has published Report No. 87 on "The Relation Between Illumination and Visual Efficiency," by H. C. Weston (H.M.S.O., 9d.).

The latest addition to the list of DTD Specifications (No. 200A, superseding DTD200) concerns hard drawn high nickel-copper alloy bars and strips.

British Industrial Plastics Co., Ltd., plans the erection of a plant at Oldbury to produce a new plasticiser for aminoplastic resins and moulding powders.

Our contemporary, the *Oil and Colour Trades Journal*, has said good-bye to its orange "patchwork" cover and appears in a brighter raiment.

A list of chemical products, the import of which into Canada has now been freed from control, appears in the latest issue of *The Board of Trade Journal*.

"Problems of Mobilisation and Reconversion," by James F. Byrnes, Director of War Mobilisation and Reconversion, reprinted by H.M.S.O. (price 1s.), is a report on the war effort of the United States.

Mechanisation of coal mining is to be speeded up: Government orders amounting to £6 million are to be placed with equipment manufacturers, the machinery to be supplied to collieries on favourable terms.

The Ministry of Food announces that there will be no change in the existing prices of unrefined oils and fats and technical animal fats allocated to primary wholesale and large trade users during the four weeks ending March 31.

Beacon Hill, west of Halifax, where two seams of clay, one highly aluminous, the other with a high silica content, as well as a ten-inch seam of coal, have been used commercially since 1783 in the production of refractories, has made an essential contribution to the war effort.

The Industrial Pest Control Association recently heard a lecture by Dr. A. B. P. Page, of Imperial College. The subject, "Combined Operations," covered the simultaneous use of more than one method of eliminating infestations. Dr. Page suggested the greater use of stimulants or irritants preferably incorporated in, and applied with, pest control products which increased the activity of the pests, thereby increasing the possibility of contact between the pest and the lethal product; or, where this contact is assured, the picking up of a lethal dose by the pests. The lecturer suggested that the search for products with these properties might be complementary to the search for products with insecticidal activity.

From Week to Week

In his report for 1943-44, Principal W. Ibeson, of Widnes Technical College, reported that the number of chemistry students had increased by 30 to 116. The Governors had been active, he said, in recommending to the County Educational Committee that a new technical college be provided.

That practical publication of the Copper Development Association, "Classification of Copper and Copper Alloys," has been brought up to date and re-issued. As copper and its alloys are now being increasingly released for many purposes, the present revision is most opportune. Copies of the publication (No. 36) can be obtained free of charge from the Association (9 Bilton Road, Rugby, Warwickshire) by any person giving evidence of responsible status or genuine interest.

The useful practice of chemical "colloquia," that is to say talks by senior research workers on topics they have themselves worked on, has been revived at Cambridge. Dr. N. B. Chapman showed how intricate mechanisms are involved in the oxidation of aromatic amines by hydrogen peroxide in presence of peroxidase; while the little-known chemistry of xanthic acids was elucidated in a lecture by Dr. G. Bulmer. The two remaining colloquia this term should prove to be of somewhat greater general interest.

The X-ray Analysis Group of the Institute of Physics announces that its 1945 conference (the fourth in the series) will be held on April 12 and 13 at the Royal Institution, London, Sir Lawrence Bragg in the chair. Professor J. D. Bernal will lecture on "The Future of X-ray Analysis," and there will be several other papers. Discussions on the equipment of a laboratory for X-ray analysis and an interpretation will follow. Further particulars may be obtained from Dr. H. Lipson, hon. sec., Crystallographic Laboratory, Free School Lane, Cambridge.

Foreign News

Nine oil companies are engaged on exploration activities in Canada's Maritime Provinces.

Chile's import duty on aluminium sulphate has been reduced from 0.35 to 0.25 gold pesos per kg. for one year.

The United States are now the chief supplier of sodium bicarbonate to the S. Paulo market in Brazil.

A modern rubber laboratory has been established, with the help of U.S. experts, at the Instituto Agronomico do Norte, Belem, Brazil.

High-grade kyanite has been discovered in Kenya and shipments have started already to Great Britain and the Middle East.

Colombia's Instituto de Fomento Industrial plans the establishment of an iron and steel plant, utilising the deposits at Paz del Rio, north of Bogosmo.

United States rayon output amounted to 724 million lb. last year, against 663 million lb. a year ago. Staple fibre accounted for 23 per cent.

The Bogota Electric Supply Company, Colombia, is studying the exploitation of natural gas deposits with a view to supplying the capital with gas for domestic purposes.

The American Cyanamid Company and the Texas Co. have jointly formed the Jefferson Chemical Co., a wholly owned subsidiary, to engage in the manufacture and sale of chemicals from petroleum.

Thallium production was begun in Canada last year at the Flin Flon (Man.) plant of the Hudson Bay Mining and Smelting Co., Ltd., output aggregating 128 lb., valued at \$1690.

Sulphur production in the United States in August, 1944, reached its highest monthly total since 1942. The output, at 306,146 long tons, was 47 per cent. higher than the figure for August, 1943.

Oil developments in the U.S.S.R. include the opening up of a new field in the Fergana Valley of Uzbekistan, where a pipeline is under construction and progress in the fields on the Pechora River.

Sulphuric acid needs of the Soviet oil refineries at Baku will be met to a greater extent by domestic production as the result of the discovery of pyrites deposits in the Little Caucasus.

Orton, a reddish brown viscous liquid completely soluble in cold or hot water, claims to be the first complete synthetic replacement for vegetable tannins. According to the Röhm & Haas Co., Philadelphia, it will produce leather equal in quality to that treated with imported materials.

Sweden is going through a fuel crisis as a result of a heavy decline in shipments of coal from Germany. It is reported that a new company has recently been formed by the Stockholm, Göteborg and Malmö gasworks to produce coal from peat on a large scale.

As a result of 18 months' study by some 50 U.S. experts of the F.E.A. a 12-volume report on the industrialisation of China has been submitted to the Chinese Ministry of Economic Affairs. The plan envisages the erection of about 170 plants in mining and metallurgy, and of 105 in the chemical and processing industries.

A test paper for detecting porosity in plated coatings is being made by the Hanson-Van Winkle-Munning Co., Matawan, N.J. Known as "Fotopor," it is used for determining the porosity of nickel deposited on iron and steel. It can also be used to test the porosity of chromium, copper, brass and tin over iron and steel, as well as these metals over copper and brass.

The "Indian Trade Journal" of December 21, 1944, contains a copy of a Government notification amending the schedule of import restrictions concerning copper and zinc, and a revised list of tariff values, for the assessment of customs dues, affecting a variety of chemical products, including coal pitch, ammonia products, sodium compounds, borax and boric acid, and dyestuffs.

A new American company, the Airco Export Corporation, has been formed, says Reuter, to consolidate and direct the export business of the Ohio Chemical and Manufacturing Co., Air Reduction Sales Co., National Carbide Corp., Wilson Welder & Metals Co., Inc., and Pure Carbonic Inc. (subsidiaries of Air Reduction Co., Inc.) as well as of other chemical manufacturing companies.

An agreement has been signed between France, Belgium and Luxembourg, to operate immediately, concerning commercial transactions. Though necessarily small in scope to-day, it envisages the possibility of an eventual customs union. For the moment it covers the export from France of agricultural materials, chemicals, building stone, and slate, while France will receive, among other manufactured articles, sulphur and matches.

Unikol, a new rust preventative and antioxidant, was discovered and developed in the Soviet Union during the war. It originated in the Colloid Chemistry Laboratory at Moscow and was first extensively used to remove rust from vast supplies of enemy equipment captured in 1941-2. Its properties have since been greatly improved and Unikol is now being used on a large scale in a variety of ways, including the preservation of oil-well casings.

Three pyridylmercuric salts—chloride, stearate, and acetate—are being commercially produced for fungicidal use by Mallinckrodt Chemical Works, St. Louis, Missouri. Among the materials which can be protected with the new fungicides are: textiles, cork, paint, varnish, wax, paper, synthetic resins, rubber, leather, oils, and greases. Tests indicate that the salts meet the requirements of a good fungicide. They resist leaching by water, and, being non-volatile at ordinary temperatures, there is little loss by volatilisation, and sunlight does not impair their fungicidal qualities. Effective concentrations of the chloride and stearate appear to have no irritant effect on the skin.

Despite difficulties in obtaining equipment, the Tata Chemical Co. has extended its scope of operations at Mithapur, India, says Reuter. Plants have recently been completed for the electrolytic production of alkalis, liquid chlorine and bleaching powder; and hydrochloric acid, chlorides (zinc, potassium, and magnesium), bromides, and magnesium sulphate are also being produced.

Three papers on the progress of penicillin manufacture in the U.S. were delivered to the American Institute of Chemical Engineers at their recent St. Louis meeting, the speakers including a representative of the Commercial Solvents Corporation and two of Chas. Pfizer & Company. Problems indicated for future solution are the attainment of higher potencies in the "broth" and means for controlling losses in recovery.

To supply Moscow with natural gas from the oilfields of Saratov, on the Volga, a 500 miles pipeline is being built, which will cross about 90 rivers and five lakes. It will be welded throughout. Six compressing stations will be installed in Saratov, and two distributing stations in Moscow. The pipeline will bring about a fivefold increase in the capital's gas supply, and will prove highly beneficial to electric power stations, transport and industry in general.

Great increases in production and exports were witnessed in the Belgian Congo during 1943. Exports of the chief minerals were as follows: copper, 188,704 tons (160,271) tons: tin in ingots, 10,841 tons (1,813 tons); manganese, 12,883 tons (13,303 tons); zinc, 21,420 tons (6,929 tons), and diamonds, 10,273,000 carats (5,759,246 carats). Restrictions on imports lead to the establishment of local manufacturing industries including tanneries, starch-works and the production of silk and silk-gut.

Forthcoming Events

March 10. Institute of Physics (South Wales Branch inaugural meeting). Physics Department, University College, Swansea, 2.30 p.m. Dr. C. Sykes, F.R.S.: "Physics in Metallurgy." Visitors are welcome.

March 10. Society of Glass Technology (Yorkshire Section). Glass Works, B.T.H., Ltd., Chesterfield. 2.30 p.m., tour of works; 3.30, Messrs. A. E. Dale and J. E. Stanworth: "Sealing Glasses."

March 10. Royal Institute of Chemistry (Liverpool and N.W. Section). Municipal Technical College, Victoria Square, Widnes. 3 p.m. Dr. J. F. J. Dippy: "The Mechanism of Condensation Reactions."

March 12. Royal Institute of Chemistry. London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 4 p.m. Annual general meeting.

March 12. Society of Chemical Industry (Yorks Section). Hotel Metropole, Leeds. 4.45 p.m. Annual general meeting. 6 p.m. Lectures. Mr. S. W. Butterworth: "Flour"; and Mr. E. F. Eaton: "Colour in Foods."

March 13. Chadwick Public Lectures. London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1. 2.30 p.m. Dr. Albert Parker, Director, Fuel Research, D.S.I.R.: "Atmospheric Pollution."

March 14. The British Association of Chemists. Chemical Society's Rooms, Burlington House, W.1, 6.30 p.m. Dr. H. F. Rance: "The Chemist in the Paper Industry."

March 14. Society of Chemical Industry (S. Wales Section) and **Royal Institute of Chemistry.** Technical College, Newport, Mon., 6.45 p.m. Dr. H. E. Crossley: "The Nature and Significance of the Inorganic Substances in Coal."

March 14. Royal Society of Arts. John Adam Street, Adelphi, London, W.C.2. 1.45 p.m. Mr. J. H. O. Bunge: "The Thames Barrage and its Importance in the London Reconstruction Plans" (lantern slides).

March 15. The Chemical Society, Burlington House, Piccadilly, W.1, 2.30 p.m. Professor E. K. Rideal, D.Sc., F.R.S.: "Reactions in Monolayers" (Laversidge Lecture).

March 16. Royal Institute of Chemistry (South Wales Section). Royal Institution of South Wales, Swansea, 6.30 p.m. Dr. C. A. Edwards, F.R.S.: "The Straining of Metals" (postponed from March 9).

March 16. The Institute of Fuel (Scottish Section). Royal Technical College, Glasgow, 5.45 p.m. Mr. P. M. K. Embling: "The Gasification of Bituminous Coal in Producers."

March 17. The Institution of Chemical Engineers (North-Western Branch). The College of Technology, Manchester, 3 p.m. Messrs. J. P. V. Woolam and A. Jackson: "The Removal of Oxides of Sulphur from Exit Gases."

March 20. Royal Society of Arts. John Adam Street, Adelphi, W.C.2, 1.45 p.m. Dr. A. C. Thaysen: "Food Yeast: Its Nutritive Value and its Production from Empire Sources" (with lantern slides).

March 20. The Chemical Engineering Group (S.C.I.) and **The Institution of Chemical Engineers.** Rooms of the Geological Society, Burlington House, Piccadilly, W.1, 2.30 p.m. Discussion: "Industrial Research." Opener: Dr. E. W. Smith.

March 22. Newcastle Chemical Industry Club. 18 Lovaine Place, Newcastle-on-Tyne, 2, 6.45 p.m. Mr. A. P. Alcock: "Explosives in Mining and Quarrying" (with lantern slides).

Company News

B. F. Goodrich reports a net profit for 1944 of \$12,015,842 (\$11,584,501).

The Allied Chemical Company has declared a regular quarterly dividend of \$1.50 per share.

Yorkshire Indigo, Scarlet and Colour Dyers, Ltd., reports a trading profit, for the year to December 31, of £15,136 (£15,545). Net profit fell from £6109 to £3790.

Alliance Colour & Chemical Co., Ltd., Atlantic Street, Broadheath, Cheshire, have changed their name to I.C.I. (Export), Ltd.

British Xylonite, Ltd., has declared a second interim dividend of 7½ per cent. on the ordinary, in lieu of a final, making 10 per cent. (same).

British Oil & Cake Mills, Ltd., declared a final on cumulative preference ordinary, for the year to December 31, of 7½ per cent., again making 12½ per cent.

Lovering China Clays Co., Ltd., has declared payment of interest on the 6 per cent. debentures of 5 per cent., plus interest, for the period to September 30, 1944.

Benzol and By-Products, Ltd., announce a dividend of 3 per cent. on the 6 per cent. cumulative participating preference shares on account of arrears for the six months to September 30, 1945.

The Viscose Development Co., Ltd., has made a net profit, for the year ended December 31, of £10,179 (£11,142), and has declared a final dividend of 7½ per cent., making 10 per cent. (same).

British Burmah Petroleum Co. and South African Torbanite Mining and Refining Co. announce that from March 26 their address will be Cross Keys House, 56 Moorgate, London, E.C.2.

General Refractories, Ltd., have made a trading profit, for the year 1944, of £186,125 (£228,283). Net profit is £52,941 (£49,403). An unchanged dividend of 7½ per cent. is proposed.

Canadian Celanese Corp. pays a quarterly dividend of 25 cents (same) and an extra 25 cents (same) on common stock. On 7 per cent. participating preferred, participating dividend of 57 cents and a regular dividend of \$1.75 were also declared.

British Industrial Plastics, Ltd., have reported a trading profit, for the year to September 30 last, of £240,107 (£327,852). The net profit totals £21,705 (£21,659). The company maintains its ordinary dividend at 8 per cent.

The Salt Division of **Canadian Industries, Ltd.**, ceases to be part of the chemical group, and, in conjunction with the fertiliser divi-

sion, becomes part of a new industrial group to be known as the fertiliser and salt group as from December 31, 1944.

The Zinc Corporation announces a dividend of 2s. per share, being the second half of the fixed cumulative dividend on the preference shares, and an interim participating dividend of 1s. on both preference and ordinary shares.

Courtaulds, Ltd., report that profit before taxation, for the year 1944, totals £3,202,434 (£3,687,422). Taxation absorbs £2,278,251, or 71 per cent. of the profits (£2,554,299, or 69 per cent.). A final of 5 per cent. on the ordinary, making a total of 7½ per cent., is again to be paid.

The British Aluminium Co., Ltd., is proposing to increase the maximum number of its directors from nine to twelve, and also to alter the system of remuneration of directors by substituting a fixed fee of £1500 p.a. to each director for the present principle of payment of fees on a profit basis.

Commercial Intelligence

The following are taken from printed reports, but cannot be responsible for errors that may occur.

Companies Winding-Up Voluntarily

DERWENT BLEACHING CO., LTD. (C.W.U.V., 10/3/45.) February 22. Herbert Johnson, Blackfriars House, Parsonage, Manchester, 3, appointed liquidator.

WESTERN OXIDE & PAINT CO., LTD. (C.W.U.V., 10/3/45.) February 22. William Ch. Morgan, "Coryton Villa," Trematon Terrace, Mutley, Plymouth, appointed liquidator.

New Companies Registered

Plastilities, Ltd. (393,278).—Private company. Capital £100 in £1 shares. Manufacturers of and dealers in plastic goods, etc. First director: John Coote. Secretary: R. W. Liversidge. Registered office: 16 Albemarle Street, London, W.1.

Russells (Manchester), Ltd. (393,419).—Private company. Capital, £5250 in 5000 5 per cent. cumulative participating preference shares of £1 each and 5000 ordinary 1s. shares. Fertiliser manufacturers. Directors: J. A. McClelland, J. C. Russell. Registered office: 18 Hoghton Street, Southport.

British Paper and Board Industry Research Association (392,987).—Company limited by guarantee without share capital. The original number of members is 250, each liable for £5 in the event of winding-up. To promote research and other scientific work in connection with the paper and board and allied trades or industries, to publish books and

periodicals bearing on the said trades or industries, etc. The first ex-officio members of the Council are: Cuthbert Dixon, president (Peter Dixon & Son, Ltd.); Lt.-Col. R. Chadwick (Clyde Paper Co., Ltd.); A. Conrad Reed, J.P., M.P.; John Seddon, J.P.; Dr. G. A. Cramond, M.A., B.Sc., Ph.D. (chairman of Technical Section, Paper Makers' Association); L. G. Cottrell, B.Sc. (vice-chairman of same section). Subscribers to the Memorandum of Association include Henry Bruce & Son, Ltd., the Inveresk Paper Co., Ltd., J. Barcham Green, Ltd., the Thames Board Mills, Ltd., and Albert E. Reed & Co., Ltd. Registered office: Melbourne House, Aldwych, W.C.2.

Chemical and Allied Stocks and Shares

STOCK markets were again generally firm, although the volume of business was moderate. British Funds tended to move higher, and leading industrial shares showed numerous small gains.

Dunlop Rubber were favoured, rising to 50s., while Imperial Chemical were firm at 39s. 3d., giving a not unattractive yield on the 8 per cent. dividend basis. Lever & Unilever have been steady at 47s. 6d., Barry & Staines strengthened to 53s. 9d., and United Molasses to 38s. 1½d. Radiations at 61s. 6d., and British Aluminium at 46s. 1½d., were better awaiting the results. Pinchin Johnson were again better at 41s. 9d. pending the dividend announcement. International Paint moved higher at 116s. 9d., and Goodlass Wall 10s. ordinary strengthened to 19s. 1½d. Shares of companies with plastics interests attracted more attention, with British Industrial 2s. ordinary 6s. 7½d., on the news that application is to be made to issue additional shares to shareholders, further capital being required to meet a future expansion in export business. Erinoid 5s. shares were 12s. 4½d., and Lewis Berger 111s., while De La Rue rose further to £10 9/16.

British Oxygen have moved up to 88s. on market hopes of a higher dividend and on expectations that sooner or later there may be an issue of additional shares on favourable terms. General Refractories 10s. shares eased slightly to 16s. 9d. on the results and the maintained 7½ per cent. dividend.

Iron and steel shares kept firm, United Steel being favoured at the slightly higher level of 27s. 1½d. on the possibility of post-war expansion in export business. Baldwins (Holdings), however, eased to 6s. 6d. although profits are higher and the dividend maintained. Renold & Coventry Chain were favoured on post-war hopes, business ranging up to 47s. Dorman Long were 27s. xd., and, awaiting the results, Firth

Brown showed firmness at 79s. 4½d. Ruston & Hornsby were 51s. 6d., and Babcock & Wilcox 53s. 9d. Staveley kept firm at 54s. xd. Stewarts & Lloyds were steady at 57s. 10½d., with Tube Investments £5 9/16. Guest Keen 38s. 6d., Consett Iron 6s. 8d. units 8s. 4½d., and Whitehead Iron 89s. 4½d. Elsewhere, Metal Box shares were better at 90s. 7½d., with Murex 103s. 1½d., and Birmin Industries maintained their firmness at 90s. 7½d. British Match were 41s. 4½d. Ever Ready 44s. 7½d., and Turner & Newall higher at 85s. 6d.

British Plaster Board 5s. shares have been active around 40s., but building shares generally were not affected by the new Government emphasis on permanent house building plans. Associated Cement eased to 62s. 6d., but Tunnel Cement were better at 48s. 9d. Gas Light & Coke showed firmness at 23s. 6d. on the full results.

Textiles recorded only small movements; Bradford Dyers being 26s., Bleachers 13s. 6d., and Calico Printers 18s. 3d. British Celanese were lower at 32s. 6d., but Courtaulds at 55s. 4½d. xd regained part of the dividend deduction. Boots Drug have been active around 57s. 6d. xd, Sangers 31s. 3d., Beechams deferred 18s. 9d., and Timothy Whites 41s. 3d. British Drug Houses eased slightly at 30s. 6d. Burt Boulton strengthened further to 26s. 6d. Cellon were 23s. 6d., Fisons 50s. 6d., B. Laporte 87s., and Lawes Chemical 10s. ordinary 13s., with Monsanto Chemicals 5½ per cent. preference 23s., and Greeff-Chemicals 5s. ordinary again 9s. Oil shares regained earlier firmness, Anglo-Iranian being 113s. 1½d., Shells 81s. 10½d., and Burmah Oil 88s. 1½d. on the war news. Attock Oil were active, but at 74s. failed to hold an earlier gain.

British Chemical Prices

Market Reports

ACTIVITY in the London general chemicals market during the past week has been fairly widespread and nearly all sections report strong price conditions. There has been practically no alteration in the general supply position and makers' deliveries against contracts are satisfactory. The majority of the soda products are quoted at strong rates, with bichromate of soda, yellow prussiate of soda and chlorate of soda being called for in greater quantities than are at present available. In the potash section, permanganate of potash and caustic potash are in strong demand, while yellow prussiate of potash continues scarce with quotations more or less nominal. Acid phosphate of potash is a good market. In other directions, formaldehyde is in good call, and arsenic, borax, and crude and refined glycerine remain steady and firm. Barium chloride is in good demand. A quiet

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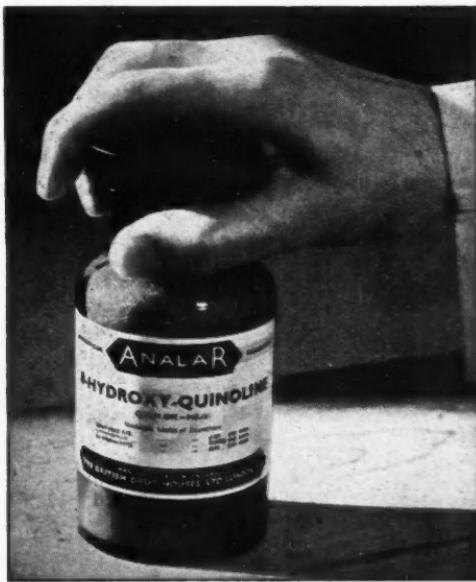
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trade is reported for most of the coal-tar products, and deliveries against existing commitments have been on a fair scale. A steady movement has taken place in creosote oil and carbolic and cresylic acid. Solvent naphtha and the xyloids are a quiet market.

MANCHESTER.—Steady to firm price conditions still obtain throughout the Manchester market for industrial chemicals. The bleaching, dyeing and finishing trades are taking relatively good deliveries of a fairly wide range of materials, while a steady demand from the West Riding woollen trade is also reported. Most other using industries are maintaining requirements on fairly steady lines and a certain amount of fresh inquiry and actual business has been in evidence. Sulphate of ammonia, superphosphates, and other fertiliser materials are meeting with a steady demand. The price feature of the market for tar products since last report has been the advance in the controlled rates for refined tar and pitch. There is a good demand for creosote oil, while a steady trade is being done in toluol and certain other light materials.

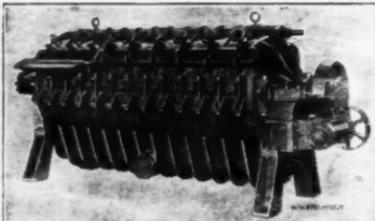
GLASGOW.—In the Scottish heavy chemical trade, business during the past week has shown a decided improvement. Inquiries for export are more numerous, but shipping space is still difficult. Prices remain very steady with no actual changes to report.

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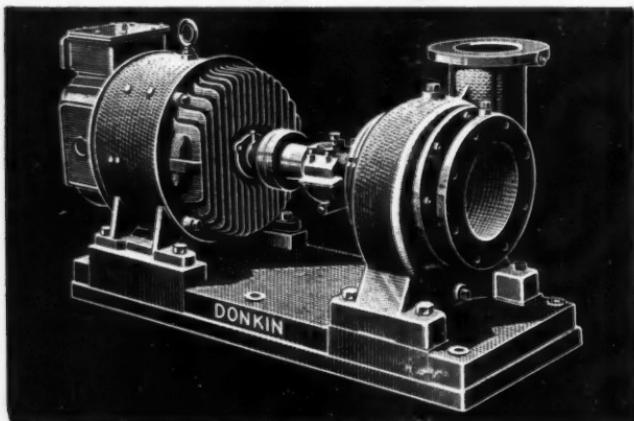
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